AP4: Simulation, Analysis & Prediction

Using AI to predict the urban climate

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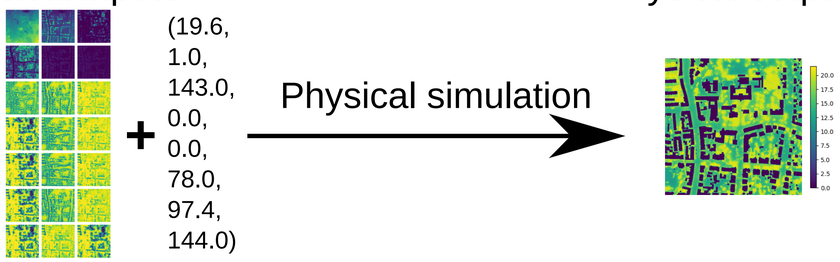
Motivation

- Physical simulations are currently the tool of choice

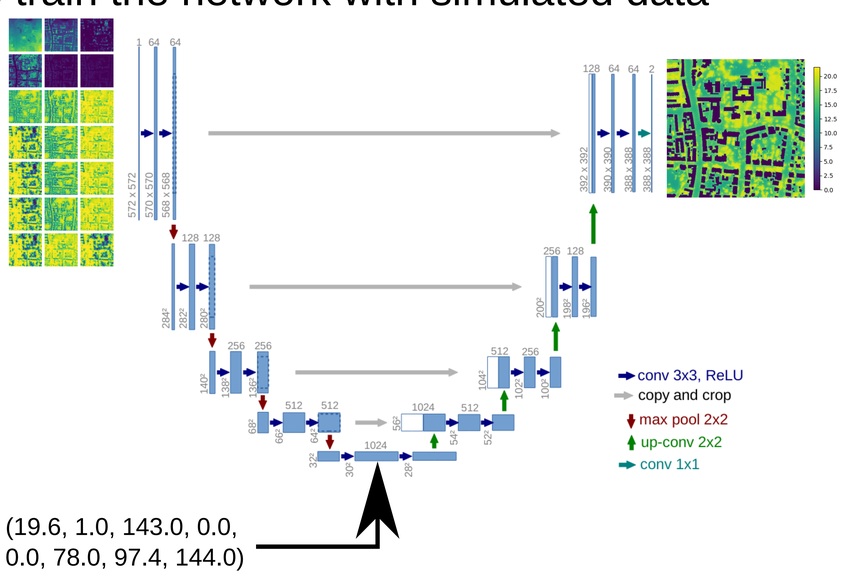
Physical inputs → Physical simulation → Physical output(s)



- But they are computationally intensive
- Estimating counterfactuals is virtually impossible

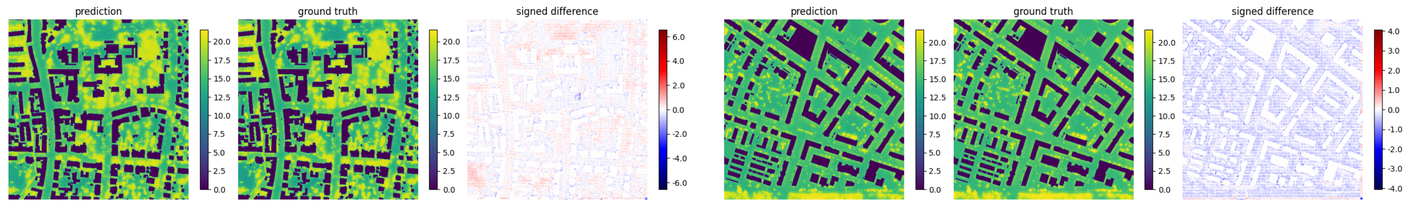
Method

- Deep neural networks achieve strong results
- They learn to approximate a function from data
- We use an encoder-decoder network (U-Net)
- We train the network with simulated data

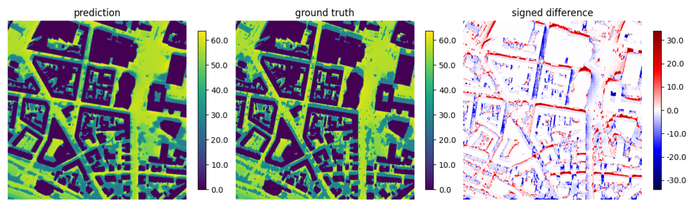


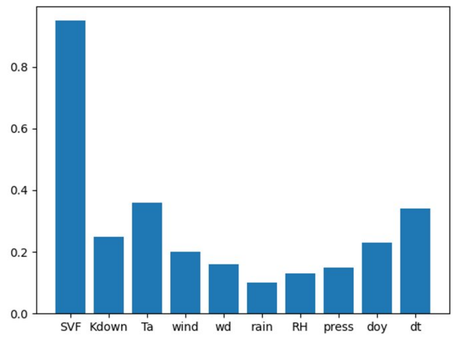
Results

- Heat module yields good results

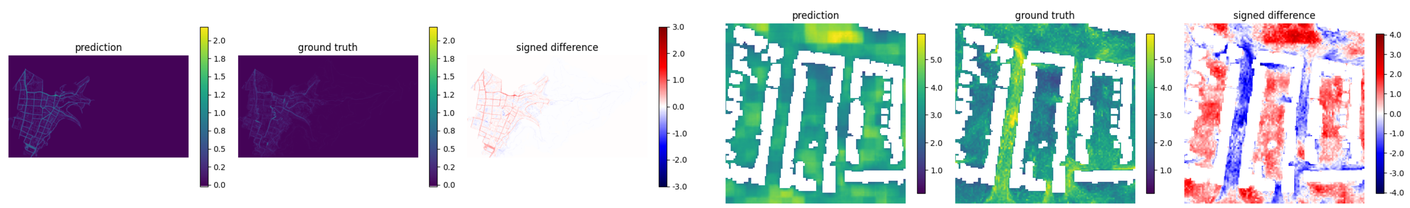


- But the position of the sun is challenging





- Water and wind modules do not work well yet



Conclusion & future work

- We can achieve good results for the heat module
- But water and wind module are currently a challenge
- Next steps:
  - Improving the function approximation by searching for a neural architecture
  - Incorporating uncertainty in inputs to account for the uncertainty of climate models
  - Estimation of counterfactuals to support urban planning